REMARKS

This is in full and timely response to the Official Action mailed September 20, 2005. Reconsideration and reexamination are respectfully requested.

Claims 1-56 and 77-88 have been cancelled in response to their withdrawal from consideration following the restriction requirement imposed by the Examiner, without prejudice or disclaimer of their underlying subject matter. Claims 61, 65, 71 and 75 have also been cancelled without prejudice or disclaimer. Finally, claims 57, 62-64, 66, 67, 72-74 and 76 have been amended and new claims 89-104 have been added such that claims 57-60, 62-64, 66-70, 72-74, 76 and 89-104 are pending for current consideration.

These amendments add no new matter. The additional features now recited in independent claims 57 and 67 are similar to the features originally recited in dependent claims 65 and 75 with clarification that the updates to symbol estimation occur iteratively at sub-symbol intervals. These features are variously described in the specification, including but not necessarily limited to FIGs. 13-15 and the related description.

Claims 57-62, 64-72 and 74-76 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. No. 6,442,154 to Bottomley ("Bottomley"), and claims 63 and 73 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Bottomley.

Applicant's claimed invention relates to cancellation of multiple user interference in a shared communications channel. As described in Applicant's specification, conventional interference cancellation techniques have various drawbacks. Typical symbol estimation techniques examine interference cancellation at the symbol level. Applicant's claimed invention efficiently updates the estimation of a symbol on a sub-symbol interval (*e.g.*, chip interval) and is not relatively expensive from a computational perspective as the calculation of interference is not reliant upon a full coupling of user estimations.

For example, independent claim 57 now recites: *[a] method for canceling multiple user interference in a communications system wherein a plurality of users communicate over a shared channel, the method comprising:*

receiving data that provides a plurality of discrete values produced at a sub-symbol interval that is less than a full symbol period;

interpolating the signature waveforms for at least some of the plurality of users to a

common sampling lattice of the received data; and

iteratively calculating a symbol estimate corresponding to a given user at the sub-symbol interval using the interpolated signature waveforms, wherein iterations of calculating the symbol estimate respectively comprise:

determining a current interference estimate for a current sub-symbol interval by combining the determined interference contributions for individual ones of the plurality of users corresponding to a previous sub-symbol interval,

removing the current interference estimate from the received data to provide an innovation signal for the current sub-symbol interval, and

in parallel, adding the innovation signal for the current sub-symbol interval to the interference contribution from a given user to produce an interference cancelled signal for the given user, using the interference cancelled signal for the given user for the current sub-symbol interval to update the symbol estimate for the given user at the current sub-symbol interval, and determining an interference contribution for individual ones of the plurality of users for use in determining a next interference estimate for a next sub-symbol interval..

These claimed features are neither disclosed nor suggested by Bottomley. Bottomley discloses a technique for successive cancellation using multiple signal timings. A chip level sampled signal is obtained in accordance with timing information that is also used to generate equivalent codes. The equivalent codes are in turn used to produce an orthogonalized code that is correlated to the signal to produce a despread value. The despread value is ultimately used in the calculation of a symbol.

Bottomley merely appears to be an example of the estimation of a symbol based upon a buffering of chip-level data, determination of a despread value, and finally symbol estimation at the full symbol interval once the despread value is fully realized. Bottomley thus collects chip level information, but only estimates a symbol after a complete determination of the despread value for a given user, which would be at the full symbol interval.

By contrast, with Applicant's claimed invention the symbol estimate is itself iteratively updated at the sub-symbol (*e.g.*, chip) interval. It does not require waiting for a correlation of the signal with the spreading waveform over the whole symbol interval. For

individual iterations of updating the symbol estimate, Applicant's claimed invention determines the current interference estimate at a current sub-symbol interval by combining the determined interference contributions of individual users from the previous sub-symbol interval. This interference is removed to provide an innovation signal, which is used to update the symbol estimate at the current sub-symbol period and to determine the interference contributions for individual users. The determined interference contributions can then be combined and used in determining interference used in the next sub-symbol iteration of updating the symbol estimate. Applicant submits that Bottomley cannot be properly construed as disclosing the iterative symbol estimation at sub-symbol intervals in the fashion claimed by Applicant.

Applicant's claimed invention also determines in parallel the interference contributions for individual ones of the plurality of users. Bottomley also fails to disclose or suggest this feature, and instead discloses a sequential processing of users previously ordered according to signal strength, wherein the despread value is determined and then the symbol is estimated for each user. Indeed, the description in Bottomley of these features further evidences that the process merely provides symbol estimates at the symbol interval. (See, *e.g.*, Bottomley FIG. 8, 8:6-12, 8:37-45). Applicant's claimed invention is believed to be more efficient as the symbol estimate is updated at the sub-symbol (*e.g.*, chip) interval, without requiring separate sequential symbol-level processing of symbol estimates for each user being considered.

Accordingly, Bottomley does not disclose or suggest various features recited in independent claim 57, and Applicant respectfully requests reconsideration and withdrawal of the rejection of those claims. For similar reasons, Applicant respectfully requests reconsideration and withdrawal of the rejection of independent claim 67 and dependent claims 58-60, 62,64, 66, 68-70, 72-74 and 76 for their incorporation of the described features, as well as the distinct features separately recited therein.

For the foregoing reasons, reconsideration and allowance of the claims which remain in this application are solicited. If further issues remain, the Examiner is invited to telephone the undersigned to resolve them.

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Respectfully submitted,

By_____

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